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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/470,236	11/15/1999	ANDREW D. BAILEY III	LAM1P123/P05	5922

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BEYER WEAVER & THOMAS LLP
P.O. BOX 778
BERKELEY, CA 94704-0778

EXAMINER	
ALEJANDRO MULERO, LUZ L	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/470,236	BAILEY ET AL.	
	Examiner	Art Unit	
	Luz L. Alejandro	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2004 and 03 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,16,17,19,23-33,35-37,39,42-50 and 52-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,16,17,19,23-33,35-37,39,42-50 and 52-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/09/04 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 50 and 52 are rejected under 35 USC 102(b) as being anticipated by Li et al., U.S. Patent 6,009,830.

Li et al. shows the invention as claimed including a gas flow system for distributing gases within a plasma process chamber 8 suitable for processing a substrate, the gas flow system comprising: a gas source (64,66) capable of supplying an input gas; a plurality of outputs (38,40) for releasing an output gas formed by a mixture of gases into said plasma process chamber, a first output 38 being configured to release said output gas into an inner region of said plasma process chamber; a

second output 40 being configured to release said output gas into an outer region of said process chamber, said inner region corresponding to a center of said substrate and said outer region corresponding to an outer portion of the substrate; and a gas flow controller (76,68,72,70,74,56,60,62,52) disposed between said gas source (64,66) and said plurality of outputs (38,40), said gas flow controller being configured to control the delivery of said output gas into said plasma process chamber, said gas flow controller having an inlet arranged to receive said input gas from said gas source, and a plurality of outlets arranged to deliver said output gas to different locations within said plasma process chamber, a first outlet being configured to deliver said output gas to said first output, a second outlet being configure to deliver said output gas to said second output, said gas flow controller adjusting the amount of said output gas that is delivered to said first and second outputs so as to provide better process control (see fig. 2 and col. 3-line 4 to col. 4-line 24).

Note that controller 76 controls the introduction of the gases through outputs 38 and 40, therefore, the same output gas can be delivered through the two outputs.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 5, 7-11, 16-17, and 56 are rejected under 35 USC 102(b) as being anticipated by Li et al., U.S. Patent 6,009,830 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810.

Li et al. is applied as above but does not expressly disclose a gas inlet receiving a single input gas comprising a mixture of etching gases and delivering the single input gas to the at least two different regions, wherein at least a first portion of the input gas being delivered to the plasma processing chamber via the first outlet and a remaining portion of the input gas being delivered to the plasma processing chamber via the second outlet. Fujii et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see,

for example, figures 3 and 6, and their descriptions). Fujiyama et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figs. 1 and 3, and their descriptions). Yamazaki et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figure 1 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. as to comprise the claimed gas inlet structure, because in such a way the same mixture of gases can be introduced to the chamber through the different regions. Furthermore, concerning the input gas being a mixture of gases or source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Li et al. modified by Fujii et al,

Fujiyama et al. or Yamazaki et al. is capable of using a source gas that is suitable for etching the substrate in the plasma processing chamber.

Additionally, note that the flow system of the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. can independently control the amount, volume or flow rate of the input gas into the at least two different regions of the plasma processing chamber. Furthermore, in the apparatus of Li et al., at least one of the outputs is configured to release the gas into an inner region of the plasma process chamber, and at least a second output is configured to release the gas into an outer region of the process chamber. Additionally, the output gas of the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al., is mixed inside the gas flow controller. For example, in Fujii et al., gas line 20 is considered part of the gas flow controller; in Fujiyama et al. the gas line supplying the gases is also considered part of the gas flow controller; and in Yamazaki et al. note that there are three gas lines that are mixed inside the gas flow controller.

Additionally, concerning claims 10-11, note that Li et al. discloses the use of gas rings (gas ring 38).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 6,009,830 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1, 3, 5, 7-11, 16-17, and 56, above, and further in view of Wing et al., U.S. Patent 6,277,235.

Li et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but do not expressly disclose that the substrate holder comprises a chuck for supporting the wafer and wherein the process gas that is flowed through the lower region of the chamber is flown through the chuck. Wing et al. discloses the use of a chuck for supporting the wafer wherein an input gas is release through the chuck (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. so as to further comprise a chuck for holding the wafer and to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable structure to hold the wafer and flowing gas into a processing chamber.

Claims 1-5, 7-11, 16-18, 50, 52 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 6,070,551 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810.

Li et al. shows substantially the invention as claimed including a plasma processing system, said plasma processing system comprising: a substantially cylindrical plasma processing chamber 6 used to process a substrate 42, said substantially cylindrical plasma processing chamber including a top region 76 located on the top surface of said substantially cylindrical plasma processing chamber, an upper peripheral region (the region around gas nozzle 34a), and a lower peripheral region (the

region around gas nozzle 34) located on a surface surrounding the periphery of said substantially cylindrical plasma processing chamber including at least an inner wall; a gas flow system operated by a processor (see col. 4-lines 59-65) and coupled to said plasma processing chamber, said gas flow system using controllers (37a,37,60) to control the flow of input gas into at least two different regions of said plasma processing chamber and comprising a gas inlet for receiving input gas to be delivered into the plasma processing chamber and at least first and second gas outlets; wherein said at least two different regions include a lower peripheral region and a top region of the chamber and the peripheral region is not part of the top region (see Fig. 3 and col. 4-line 33 to col. 5-line 63).

Li et al. does not expressly disclose the gas inlet receiving a single input gas comprising a mixture of etching gases and delivering the single input gas to the at least two different regions, wherein at least a first portion of the input gas being delivered to the plasma processing chamber via the first outlet and a remaining portion of the input gas being delivered to the plasma processing chamber via the second outlet. Fujii et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figures 3 and 6, and their descriptions). Fujiyama et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases

and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figs. 1 and 3, and their descriptions). Yamazaki et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figure 1 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. as to comprise the claimed gas inlet structure, because in such a way the same gas (or mixture of gases) can be introduced to the chamber through the different regions. Furthermore, concerning the input gas being a mixture of gases or source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. is capable of using a source gas that is suitable for etching the substrate in the plasma processing chamber.

Regarding claims 7-9, note that the flow system of the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. can independently control the amount, volume or flow rate of the input gas into the at least two different regions of the plasma processing chamber.

With respect to claims 10-11, note that Li et al. suggests the replacement of the gas injectors of Fig. 1 with gas rings (see col. 8-lines 7-22).

Concerning claim 50, note that in the apparatus of Li et al., one of the outputs is configured to release the gas into an inner region of the plasma process chamber (outlet 56), and a second output is configured to release the gas into an outer region of the process chamber (outlets 34 and 34a).

Regarding claim 52, the output gas of the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al., is mixed inside the gas flow controller. For example, in Fujii et al., gas line 20 is considered part of the gas flow controller; in Fujiyama et al. the gas line supplying the gases is also considered part of the gas flow controller; and in Yamazaki et al. note that there are three gas lines that are mixed inside the gas flow controller.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 6,070,551 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-11, 16-18, 50, 52 and 56, above, and further in view of Wing et al., U.S. Patent 6,277,235.

Li et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but do not expressly disclose where the process gas that is flowed through the lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Claims 1-5, 7-9, 16-17, 19, 23-25, 28-33, 35, 37, 39, 42-44, 46, 48, 50, and 52-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al., U.S. Patent 6,024,826 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810.

Collins et al. shows the invention as claimed including a plasma processing system comprising: a substantially cylindrical plasma processing chamber within which a plasma is both ignited and sustained for processing a substrate 156, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end and including a top region located on the top surface of the chamber, an upper peripheral region, and a lower peripheral region located on a surface surrounding the periphery of said processing chamber; and a gas flow system (164a-d, 300) coupled to said plasma processing

chamber, said gas flow system controlling the flow of input gas into at least two different regions of said plasma processing chamber and comprising a gas inlet for receiving input gas to be delivered into the plasma processing chamber and at least first and second gas outlets; wherein said at least two different regions including at least one peripheral region located at a top side surface of said plasma processing chamber (gas lines 164d), at least one top region located at a center top surface of said plasma processing chamber (gas line 164 a), said peripheral region being located closer to said upper end of said plasma processing chamber than said lower end of said plasma processing chamber; a lower peripheral region (gas line 164b), and a lower region near edges of the substrate (gas line 164c); and wherein the apparatus further comprises a coupling window disposed at an upper end of the plasma processing chamber, and an RF antenna arrangement disposed above a plane defined by the sbstrate when the substrate is disposed within the plasma processing chamber. For a complete description of the apparatus see, for example, figs. 8a-b, 9, and 13-21 and their descriptions.

Collins et al. further discloses that a process gas is furnished into the chamber through any one or all of the variety of gas lines (164a-d) but does not expressly disclose a gas inlet receiving a single input gas comprising a mixture of etching gases and delivering the single input gas to the at least two different regions, wherein at least a first portion of the input gas being delivered to the plasma processing chamber via the first outlet and a remaining portion of the input gas being delivered to the plasma processing chamber via the second outlet. Fujii et al. discloses an apparatus

comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figures 3 and 6, and their descriptions). Fujiyama et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figs. 1 and 3, and their descriptions). Yamazaki et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figure 1 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Collins et al. as to comprise the claimed gas inlet structure, because in such a way the same mixture of gases can be introduced to the chamber through the different regions. Furthermore, concerning the input gas being a mixture of gases or source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is

being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Collins et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. is capable of using a source gas that is suitable for etching the substrate in the plasma processing chamber.

Additionally, note that the flow system of the apparatus of Collins et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. can independently control the amount, volume or flow rate of the input gas into the at least two different regions of the plasma processing chamber. Furthermore, in the apparatus of Collins et al., at least one of the outputs is configured to release the gas into an inner region of the plasma process chamber, and at least a second output is configured to release the gas into an outer region of the process chamber. Additionally, the output gas of the apparatus of Collins et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al., is mixed inside the gas flow controller. For example, in Fujii et al., gas line 20 is considered part of the gas flow controller; in Fujiyama et al. the gas line supplying the gases is also considered part of the gas flow controller; and in Yamazaki et al. note that there are three gas lines that are mixed inside the gas flow controller.

Claims 6, 36, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al., U.S. Patent 6,024,826 in view of Fujii et al., U.S. Patent 4,980,204, or

Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-9, 16-17, 19, 23-25, 28-33, 35, 37, 39, 42-44, 46, 48, 50, and 52-56, above, and further in view of Wing et al., U.S. Patent 6,277,235.

Collins et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but do not expressly disclose that the substrate holder comprises a chuck for supporting the wafer and wherein the process gas that is flowed through the lower region of the chamber is flown through the chuck. Wing et al. discloses the use of a chuck for supporting the wafer wherein an input gas is release through the chuck (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Collins et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. so as to further comprise a chuck for holding the wafer and to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable structure to hold the wafer and flowing gas into a processing chamber.

Claims 10-11 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al., U.S. Patent 6,024,826 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-9, 16-17, 19, 23-25, 28-33, 35, 37, 39, 42-44, 46, 48, 50, and 52-56, above, and further in view of Li et al., U.S. Patent 6,070,551.

Collins et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but fail to expressly disclose the use of gas rings. Li et al. discloses that gas nozzles

can be replaced by rings or ring-like structures since they are suitable gas introduction means. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Collins et al. modified by Fujii et al., Fujiyama et al. or Yamazaki et al. as to comprise a gas ring structure as the gas introduction means because such structure is known and suitable for introducing the gas into the chamber.

Claims 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al., U.S. Patent 6,024,826 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-9, 16-17, 19, 23-25, 28-33, 35, 37, 39, 42-44, 46, 48, 50, above, and further in view of Ueda et al., U.S. Patent 5,810,932 and Kadomura, U.S. Patent 6,096,160.

Collins et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but fail to expressly disclose the electromagnet and dc supply arrangement as claimed. Ueda et al. discloses a chamber 15; a coupling window 11 disposed at an upper end of the chamber; an RF antenna 12 disposed above a plane defined by the substrate; and an electromagnet arrangement 14 proximate the antenna (see Figure 7 and its description). Additionally, Kadomura discloses a magnet arrangement 53 whereby a d.c. power supply 68 is coupled to the magnets and is varied in a controlled manner (see abstract) in order to better control the plasma. In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to modify the apparatus of Collins et al. modified by Fujii et al., Fujiyama et al. or Yamazaki et al., so as to include the controller and electromagnet arrangement of Kadomura and Ueda et al. because such a control system allows for better controllability of the plasma system.

Claims 1-5, 7-11, 16-17, 19, 23-34, 35, 37, 42-44, 46, 48, and 53-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al., U.S. Patent 6,228,781 in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810.

Murugesh et al. shows the invention substantially as claimed including a plasma processing system 10 comprising: a plasma processing chamber within which a plasma is both ignited and sustained for processing a substrate 17, said plasma processing chamber having no separate plasma generation chamber, and having an upper end and a lower end, the processing chamber including a top region 46 located on the top surface of said plasma processing chamber and an upper peripheral region (the region around gas nozzles 38,40) located on a surface surrounding the periphery of said plasma processing chamber; a gas flow system coupled to said plasma processing chamber (for example, 35A, 35A', 35B, 35B'), said gas flow system controlling flow of input gas into at least two different regions of said plasma processing chamber, wherein said at least two different regions include at least a top central region, an upper peripheral region, and a lower peripheral region of the chamber; wherein said upper peripheral region is closer to the upper end of the plasma processing chamber than the

lower portion of the plasma processing chamber; a coupling window disposed at an upper end of the plasma processing chamber; and an RF antenna arrangement disposed within the plasma processing chamber, (see figs. 1A-1D and col. 4-line 43 to col. 8-line 10).

Murugesh et al. does not expressly disclose a cylindrical processing chamber. However, regarding the shape of the chamber, such configuration is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed coil is significant, see In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Murugesh et al. does not expressly disclose a gas inlet receiving a single input gas comprising a mixture of etching gases and delivering the single input gas to the at least two different regions, wherein at least a first portion of the input gas being delivered to the plasma processing chamber via the first outlet and a remaining portion of the input gas being delivered to the plasma processing chamber via the second outlet. Fujii et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figures 3 and 6, and their descriptions). Fujiyama et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a

first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figs. 1 and 3, and their descriptions). Yamazaki et al. discloses an apparatus comprising a gas inlet receiving a single input gas which comprises a mixture of gases and delivering the single input gas to at least two different regions; wherein a first portion of the input gas can be delivered to the plasma processing chamber via a first outlet and the remaining portion of the input gas can be delivered to the plasma processing chamber via a second outlet (see, for example, figure 1 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Murugesh et al. as to comprise the claimed gas inlet structure, because in such a way the same mixture of gases can be introduced to the chamber through the different regions. Furthermore, concerning the input gas being a mixture of gases or source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Murugesh et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. is capable of using a source gas that is suitable for etching the substrate in the plasma processing chamber.

Additionally, note that the flow system of the apparatus of Murugesh et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al. can independently control the amount, volume or flow rate of the input gas into the at least two different regions of the plasma processing chamber. Furthermore, in the apparatus of Murugesh et al., at least one of the outputs is configured to release the gas into an inner region of the plasma process chamber, and at least a second output is configured to release the gas into an outer region of the process chamber. Additionally, the output gas of the apparatus of Murugesh et al. modified by Fujii et al, Fujiyama et al. or Yamazaki et al., is mixed inside the gas flow controller. For example, in Fujii et al., gas line 20 is considered part of the gas flow controller; in Fujiyama et al. the gas line supplying the gases is also considered part of the gas flow controller; and in Yamazaki et al. note that there are three gas lines that are mixed inside the gas flow controller.

Additionally, concerning claims 10-11 and 26-27, note that Murugesh et al. discloses the use of gas rings (gas ring 37).

Claims 6, 36 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al., U.S. Patent 6,228,781, in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-11, 16-17, 19, 23-34, 35, 37, 42-44, 46, 48, and 53-54 above, and further in view of Wing et al., U.S. Patent 6,277,235.

Murugesh et al., Fujii et al., Fujiyama et al. and Yamazaki et al. are applied as above but do not expressly disclose where the process gas that is flowed through the

lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Murugesh et al. modified by Fujii et al., Fujiyama et al. or Yamazaki et al., so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Claims 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al., U.S. Patent 6,228,781, in view of Fujii et al., U.S. Patent 4,980,204, or Fujiyama et al., U.S. Patent 4,529,474, or Yamazaki et al., U.S. Patent 4,105,810, as applied to claims 1-5, 7-11, 16-17, 19, 23-34, 35, 37, 42-44, 46, 48, and 53-54 above, and further in view of Ueda et al., U.S. Patent 5,810,932 and Kadomura, U.S. Patent 6,096,160.

Murugesh et al., Fujii et al., Fujiyama et al., and Yamazaki et al. are applied as above but fails to expressly disclose the electromagnet and dc supply arrangement as claimed. Ueda et al. discloses a chamber 15; a coupling window 11 disposed at an upper end of the chamber; an RF antenna 12 disposed above a plane defined by the substrate; and an electromagnet arrangement 14 proximate the antenna (see Figure 7 and its description). Additionally, Kadomura discloses a magnet arrangement 53 whereby a d.c. power supply 68 is coupled to the magnets and is varied in a controlled manner (see abstract) in order to better control the plasma. In view of this disclosure, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Murugesh et al. modified by Fujii et al., Fujiyama et al. or Yamazaki et al., so as to include the controller and electromagnet arrangement of Kadomura and Ueda et al. because such a control system allows for better controllability of the plasma system.

Response to Arguments

Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Luz L. Alejandro
Primary Examiner
Art Unit 1763

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